



VOL. 7 NO. 9

SEPTEMBER 1987

September Meeting Schedule

General Meeting: Tues Sept 1st 7:00 PM
Granada Hills High School

ST Sig Meeting: Tues Sept 15th 7:00 PM
Mercury Savings and Loan

Future Meetings

General ST Sig

Oct	Tues 6	Tues 20
Nov	Wed 4	Tues 17
Dec	Tues 1	Tues 15

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ARTISTS
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For each new membership you bring into LA-ACE you will earn \$5.00 credit towards your membership renewal plus the new member will receive 4 door prize tickets free.

Meeting Agenda

Whips and Chains Galore

Guest speaker from DataSoft -
Intelicreations will be demonstrating
Alternate Reality- The Dungeon.

Door Prizes:

- DataSoft Software
- AlphaCom Printer w/8-bit interface
- Dbasic w/manual (Faster than 'C')
 - 8-bit Disk of the Month

Newsletter Awards:

1st Prize - Doug Kelly
2nd Prize - Justin Scott

HELP

Volunteers are needed for a 2 hour shift at the Atari Faire V.2 on Sept 19th & 20th

KILL a HAPPY FACE

At the Sept ST Sig meeting there will be a MidiMaze contest. Interested parties contact Tim Laren at the Sept General Meeting to make arrangements. We will have several computers but may need a few more. Thanks.

Reprinted from SBACE

This is to point out to the members of SBACE how desparate Bill Little is for material if he publishes this. It should show that being newsletter editor is not an easy job. (Amen!!! - editor)

FRED and ME

By D.B.

I'm an 8 bit man myself
And I'm as proud as I can be;
You won't find mine on a shelf
It's still an 8 bit world for me!

Oh, those 16 bits are nice;
I'm sure we all agree
And it's not the higher price
That keeps the world 8 bit for me.

I just can't put away
That XL or sweet XE
Or old 800 Fred
Who's been such a friend to me.

I learned the language that he used,
Learned his text and graphics mode;
I'm sure he laughed sometimes at me
While learning all his basic code.

But he stayed a friend to me,
Tolerated fumbling fingers;
Though sometimes we'd disagree
Those fond memories still do linger

I must admit that I'm impressed
By the world of the ST,
All that speed and fancy dress
And what it does so graphically

But make it like an IBM?
I must say I can't condone it
The chances are, I think, real slim
That they'll take old Fred-and clone it.

So I'll talk to old Fred daily
And say Fred-how bout this?
He may take a while to answer
But It's like a lovers kiss

So much sweeter if they linger,
So much better if they're slow,
So I'll keep giving Fred the finger
But I'll never let him go.

LA-ACE Newsletter

This newsletter is written and printed by the members of the Los Angeles Atari Computer Enthusiasts, an association of individuals with a common interest, using and programming Atari Computers. This group is not affiliated with Atari Corporation nor with any other commercially oriented organization. Any logos, trademarks or company names are used with permission or as an informal method of referring to a product or company.

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12 month membership fees:

Individual	\$20.00
Family	\$20.00
Associate	\$6.00

Individual and Family membership includes subscription to this newsletter, membership access to the LA-ACE BBS, and access to the general meetings. Associate membership includes access to LA-ACE BBS only.

LA-ACE Meetings

The General Meetings are held on the first Tuesday of the month at 7:00pm unless otherwise posted in this newsletter. All other Special Interest Group meetings (SIGs) times will be posted in this newsletter.

Advertising

This newsletter is supported through the members of LA-ACE and its supporters. All advertisements must be submitted, camera read and paid in full, no later than the first Saturday following the General Meeting. There are discounts for long term or concurrent advertisements.

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AACE Meeting Minutes

August 1987
By Douglas Kelley

We had a hot meeting this month - both literally and figuratively! With no air conditioning in the auditorium, we had a rather short meeting, but we did get quite a bit done anyways.

I would like to say at this time that I am stepping down as Secretary due to the fact that I am going to college. We need a new secretary before the September meeting, and all you have to do is attend the general meeting and the board meeting, and write this column. Call Bill or me (our phone numbers are in here somewhere) if you would like to volunteer.

Our Vice-President, Jon Dekes, opened the meeting at 7:15PM with a question - and - answer session. We discussed Atari's ST campaign and what our favorite computer maker might buy, Prometheus modem company, the 8-bit emulator for the ST (available soon), and the upcoming Atari Faire.

The Atari Faire will be at the Glendale Civic Auditorium September 19 and 20. Tickets will be available at the September meeting for \$3. They will cost \$5 at the door. LAACE is also looking for volunteers who can do work for 1/4 or 1/2 of a day. Contact Bill if you are interested.

Jon gave is monthly "lesson", this month about "XIO" commands (for the 8-bit) and MS-DOS commands (for the IBM emulator for the ST). Next month: 8 and 16 bit DOSes.

B.Dalton Software now has Your Atari Computer, which is the 8-bit Atari bible. If you don't have this book, you need it. B.Dalton is now giving discounts to LAACE members and they **are still looking for suggestions as to what they should sell, both 8 and 16 bit.**

The LAACE financial report was read to the members and accepted. Copies are available from the Treasurer or me.

Hugh Edwards showed us a recording of "The Computer Show" (Tuesday 7PM Channel 18 GOE/KSCI) San Bernadino). The show displayed CAD 3D, how simple it was to use, and what could be done with it. CAD 3D looked impressive! A discussion of 3-D CAD applications and holograms (true 3-D) ensued.

We hope to have a few samples of holograms at the next meeting and perhaps some stuff from CAD 3D.

We had our drawing and the meeting was adjourned. Door prizes: ALPHACOM PRINTER & INTERFACE, Dr. Lee Brilliant 300 Baud Modem, DBASIC (ST), LAACE 8 and 16 bit DISKS OF THE MONTHS, LAACE

LA-ACE BBS An Oasis in any desert?

by Rich Monosson and Tim Laren
LA ACE

In the last few weeks we have been experimenting with the Oasis BBS system. As a rather new and new particularly to us BBS, we had to take the word of a couple reviews when we went looking for a new and bug-free BBS system. The reviews of Oasis BBS were positive, so for \$15 we figured that we had nothing to loose.

Along with the changeover, SpartaDos also came highly recommended not only by word-of-mouth but by the authors of Oasis. Since the Oasis BBS was written to use SpartaDos, we went for that too.

So here we are -- a new BBS system and a new DOS -- unfamiliar territory -- where no (LA-ACE) member has ever gone before...

So now that we got it up (pun not intended) we struggled with the lack of documentation and lack of clarity of using the system -- not to mention the just plain unfamiliarity with it. Add to that our resistance to change -- FoReM is so imbedded in our hearts and minds that it is difficult to relearn new habits.

Those of you who have had the opportunity to log on during these early experimental stages may have to apply for a password again as we too learn the system.

Stay tuned next month folks for another in a series of "How the LA-ACE BBS's Hard Disk Turns."

LA ACE BBS (818) 700-1652

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DBASIC
DTACK Grounded Inc.
1570 Pacheco B-7
Santa Fe, NM 87501

Dbasic is an interactive Basic for the Atari ST. It is available through the club library and comes complete with a 290 page printed and bound manual. There are claims of speed equal to and sometimes exceeding that of compiled 'C' and Pascal. From what I have seen and read these claims are true.

Although the 'version' of Basic is not the same 'type' as the Atari ST comes with it is very easy to program in. If you have ever programmed on an Apple II you will be at home here. The authors designed a 68000 board that plugged into the Apple II bus several years ago. In order to 'be compatible' with the Apple II people they used a operating system and language that most Apple people knew. So they invented HALGOL. HALGOL was named after the HAL9000 from the movie 2001 and a programing language ALGOL. Dbasic is not the same as what was running on the Apple II but it has it's roots are deeply seated in in the original work that was done on the Apple II. After 5 years of constant upgrades and improvements to HALGOL several enhansments were added to the Atari version and it actually runs faster.

Some more trivia, the name of the company. Dtack is a line that is used on the 68000 to allow the processor to wait for slow memory and other devices. If this line is grounded the processor will run at the fastest possible speed. On the plugin board that was designed for the Apple II this line was grounded to get the processor to run the fastest it could, and this is the major goal of this company, to make things run the fastest they possibly can. Hence the name Dtack Grounded.

The disk that you will get has the operating system, the interactive compiler, the monitor, and several utilities and demo programs. When you boot it Dbasic will take control of your system. You will first be greeted by a menu and three options. The defalt option, selected by simply pressing the return key, is clear. This will start you off clean and allow you to start programing.

The second option is to duplicate the disk. Once selected this options asks source drive, destination drive, and if you want to format. You will be prompted to load the disks and

told how long it will take to do and everything, pretty good hu?

The third option is the most informative and fun, the Read Me option. This is where all the demos and examples are accessed from. There are several programs for hi, med, and lo res. Most of these do simple tasks like draw random lines and shapes on the screen. They give you a good starting point to learn the language from. In mono there is one program that shows a real application, this is a program to calculate the response of a speaker and plots the results on the screen. Although I don't believe that the average person would have a use for this, I still think it is a good example and am glad it was included.

I have not read the entire manual but have made a good dent in it and realy enjoy reading it. It seems that the authors must not enjoy reading 'text books' either. The text is scattered with witty comments that make you think and has several humorous stories that are used to get a point across. There are also several examples for each command that show different ways to use them and way you might not otherwise think of.

The manual is printed in very readable text and is bound to last a lifetime. All the commands are listed in alphabetical order and take up most of the book. There is a simple introduction to Dbasic and there way of thinking in the front followed by a description of the way things were done and why (mostly for speed). This is followed by a description of all the necessities of the language like variables and data types. Then there is an area on disk storage and DOS's and file structure. Next is all the memory maps and memory storage requirements. This covers about 80 pages up to this point and the rest of the manual describes all the commands and program statements. Thats the last 200+ pages. They seem to have done a very good job on the program and the manual, I don't know if the manual makes programing in Dbasic so easy or if it's just Dbasic that's so easy to use, but I have played around with several little demo programs and they do exactly what I thought they should have and seem to run very fast. What else can you ask for?

Dbasic, with the manual, will be available for \$15. When we run out, the disks alone will be available for \$5 and the manuals from Dtack.

Graphics 7+ on the 400 & 800

By Douglas Kelley

If you have a 400 or an 800, you have undoubtedly heard about the fabled "graphics 7+" or "graphics E" mode, that has the 4 colors of graphics 7 and a resolution approaching that of graphics 8. Here is a short demonstration program showing how to create graphics 7+ and how to use it:

```

5 REM GRAPHICS 7+ DEMO
10 GOSUB 1000
20 FOR X=1 TO 3
30 COLOR X
40 PLOT 0,0:DRAWTO 159,39:DRAWTO 159,95
50 POKE 89,PEEK(89)+15
60 PLOT 159,0:DRAWTO 159,95
70 POKE 89,PEEK(89)-15
80 OPEN #1,4,0,"K":GET #1,K:CLOSE #1
90 NEXT X
99 END
1000 GRAPHICS 8+16
10 POKE 87,7
20 SETCOLOR 2,0,0
1030 RETURN

```

The program was created with the help of Mapping the Atari (page 17) and Your Atari Computer (page 282). Type in this program, SAVE it, and then RUN it. Press any key to see the 3 different colors you have (the fourth is the background).

Lets step through the program. The first line sends us to the sub - routine at 1000. Graphics mode 8 is set up, full screen. The "POKE 87,7" tricks the computer into thinking it is in graphics 7. We make the background black so that you can see the colors better, and then RETURN to line 20.

Unfortunately, there is a small disadvantage in tricking the computer into thinking it is in graphics 7 - it thinks it is in graphics 7, and uses those screen boundaries: 160 pixels across by 96 pixels down. Any attempt to PLOT or DRAWTO the bottom half of the screen gives us an "out of range" error (error #141). What to do? Well, that's where the POKE 89 comes in. Locations 88 and 89 point to the memory location of the top left corner of the screen (you can verify this:

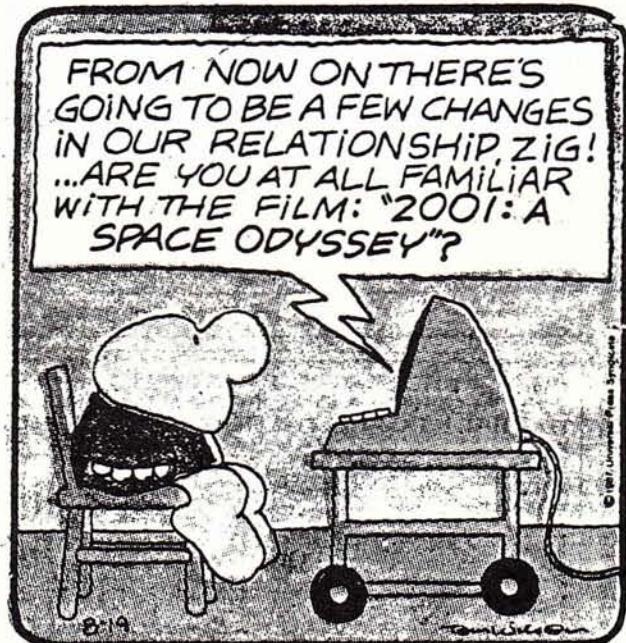
try "X-PEEK(88)+PEEK(89)*256:POKE X,33".

This will put the letter "A" in the top left corner of the screen in graphics mode 0,1 and 2. In other modes, a colored block or bar will appear.)

Technical explanation: there are 4 colors, so each pixel needs only two bits to store the color of that pixel. One byte holds the colors of 4 pixels. Since there are 160 pixels across, it requires 40 bytes to hold the info for one row. 40 bytes times 96 rows divided by 256 equals 15 (taa-dahh!).

So, by POKEing 89 with 15 more than it originally had makes the computer use the lower half of the screen now. Of course, you still have to use the graphics 7 boundaries (160 by 96: PLOT 0,0 now plots a point on the left edge of the screen halfway down), so you can't PLOT or DRAWTO the upper half of the screen. If you want a continuous line from the upper half of the screen to the lower half or vice versa, you must DRAWTO the boundary, change halves, and then finish the line (as the program above does). To be able to use the upper half of the screen again, just POKE 89 with 15 less than it now has. NOTE: using POKE 89,PEEK(89)-15 when you are already using the upper half of the screen, or using POKE 89,PEEK(89)+15 when you are already using the lower half can be hazardous to your program, not to mention your display!

So, with a few minor reservations, you now have 4 colors and 160 by 192 resolution. Enjoy!



Reading Analog Data With an ST

Part II

In last month's article on reading analog data with an ST, it was noted that the ability to read analog data was missing from the ST computers. This is one feature that the eight bit computers had, which was sometimes helpful for hardware applications. There are many things that the ST is incapable of, since the built-in analog to digital converters have not been included. With the addition of some simple hardware, the ST can regain the ability to read analog data.

It might be helpful to repeat the difference between analog and digital data for those who missed last month's article. Digital data is a set of ones and zeros, a set of transistors in either a high or a low state. The low state approaches zero volts and the high state approaches five volts. These ones and zeros form the digits

of a binary number. A set of four of these digits comprise a nibble, a set of eight of these digits comprise a byte, and a set of sixteen of these digits comprise a word.

An analog signal may be at zero or five volts, but it may also be anywhere in between those two voltage levels. We will limit our discussion to analog signals between zero and five volts, although they may be at any level above five volts. Analog signals are a problem for the computer because it cannot interpret analog voltage levels. For this reason, analog-to-digital converters are used. The analog voltage is converted to a digital number and the microprocessor can then use it in the way that the software calls for.

This is the second of two articles covering the subject of analog data reading techniques for the ST. The first article illustrated the use of voltage comparators to detect an input voltage that exceeded a pre-set reference voltage. This article illustrates the use of an analog to digital converter to read exact levels of an analog signal. It would be well to tackle the projects in the first article before taking these on, as those were easier and will give you some construction experience on a simpler level.



The heart of the hardware is an ADC803 analog to digital converter. This particular converter has a

built-in clock that is set by an external resistor and capacitor. Very few external parts are needed. One problem is that the converter needs to be strobed in order to put the digital data on the eight data output lines. For this reason, the joystick port cannot be used unless you can find a way to strobe the ADC803. Rather, the parallel port is the best choice, because the operating system automatically stobes pin one of the port when reading data.

The cartridge port is another alternative to the parallel port. The ADC803 is directly interfacable with the cartridge port so no data buffer is needed. The only problem then is obtaining the cartridge board. This can be ordered from a company called Bigfoot Systems. Their address is 2708 East Lake Street, Minneapolis, MN. I have etched my own boards but it is infinitely easier to order one from Bigfoot Systems.

For the purposes of continuity with last month's article, the example in this article will return the ambient light level to which a phototransistor is being exposed. This is an expansion of last month's project that sensed a light level that either exceeded or failed to exceed a pre-set level. The values returned by the ADC803 will range from 0 to 255. Figure 1 is the schematic of the parallel port version of the circuit.

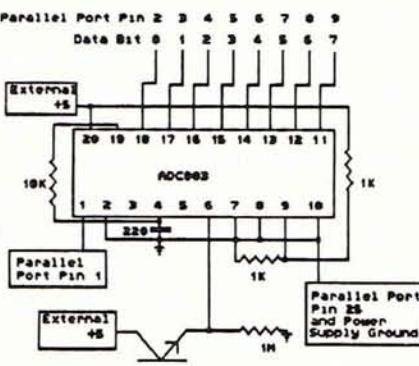


Figure 1
(continued...)



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Reading Analog Data With an ST (continued...)

Parallel Port Connections:

Parallel Port Pin	IC Pin		
1	1	15	16
2	11	16	15
3	12	17	18
4	12	18	17
5	14	31	1
6	15	40	10
7	16	Cartridge Port Version P	
8	17	-----	
9	18	1 ADC803 Analog to Digital	
11	10	Converter	
25	10	1 220 pF disk capacitor	

Parallel Port Version Parts List

- 1 ADC803 Analog to Digital Converter
- 1 220 pf disk capacitor
- 2 1K resistors
- 1 10K resistor
- 1 25 Pin connector
- Hookup wire, breadboard, 20 pin IC socket, 5 volt power supply.

It would be wise to construct the circuit on a solderless breadboard before constructing a final version. When you do make your finished product, a perforated breadboard is very convenient to use.

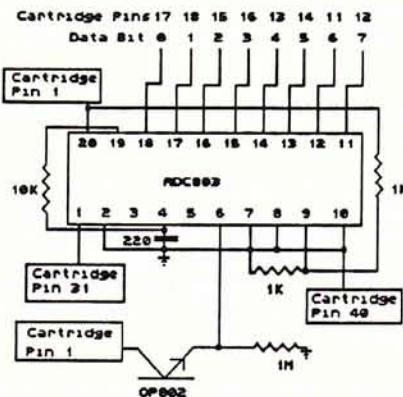


Figure 2

Figure 2 is the schematic of the cartridge port form of the circuit.

Cartridge Port Pin Connections:

Cartridge Port Pin	IC Pin
1	20
11	12
12	11
13	14
14	13

The preceding routine in BASIC is as follows.

```
10 X=PEEK(16384000)  
20 PRINT X  
30 GOTO 10
```

For more information on the cartridge port, refer to "Your ST Comes Alive!" published by Computer Spectrum. (*Who??- Ed.*) If you have any questions, feel free to call the Computer Spectrum BBS at (305) 251-1925. If you come up with a new and unique idea for the analog to digital converter, please get in touch via our BBS and let us know about it. There are several programs with source codes available on sig 2 of the Computer Spectrum BBS. Following is a list of sample programs that are available:

A2D_PAR.BAS ST BASIC program to display the status of the parallel port.

A2D_PAR.C Source code for the
 compiled program
 below.

A2D_PAR.PRG Compiled program which displays the status of the parallel port.

A2D_CAR.BAS ST BASIC program to display the status of the cartridge port.

A2D_CAR.C Source code for the
 compiled program
 below.

A2D_CAR.PRG Compiled program which displays the status of the cartridge port.

To read the data value you must read the lower cartridge RAM area. Without getting into too much detail, try the following routine.

```
char *data; char peek;  
  
main()  
{  
    data=16384000L;  
    while(!Cconis())( peek=*data;  
        printf("%u\n",peek);  
    }  
}
```

Richard "Rick" Leinecker is a Science teacher with Dade County Public Schools in Dade County, Florida. His company, Computer Spectrum, produces a series of educational games and books for the Atari computers.

Reprinted from Puget Sound Atari News

LIGHT PEN ANYONE?

A Build It Yourself Light Pen
By Thomas Lauless, R-ATARI CLUB

For the 8-Bit Atari Hardware Enthusiast!

DISCLAIMER

The device described herein operates well if constructed as directed. Since I cannot control your abilities' or materials' selection process I assume no liability for the information contained in this article. Nonetheless, it works...

INTRODUCTION

Have you ever wanted a light pen, or were maybe just a little curious as to how one worked? Well, read on, as we cover some of the mysteries of this device and explore a few ways to use it.

The first element we will discuss is the light detecting device. Normally a 'photo transistor' is used. Light turns them on, just like a switch. In this case, it's actually the electron beam that 'writes' the picture to the screen (of the monitor/TV) that turns on our photo transistor. A 74LS132 integrated circuit (I.C.) is used for buffering the output so that we get 'clean' triggers (switching).

Next, how do we know where the electron beam is? Well Atari had some foresight (did I say that?) in this department. They tied the trigger input to the GTIA and it stores the approximate location of the electron beam on the screen when the trigger input was activated. Ah! you say, that's all well and good, but how do I use this information? That's where it gets a little tricky. (You knew there had to be catch didn't you!)

Fortunately it's not really that hard for the basic 'stuff'. However, when you get up to writing pull down menu's, with icons ect., it could become a little difficult. You just 'PEEK' at locations 564 and 565. These are, respectively, the Light Pen Horizontal, and Light Pen Vertical, Shadow Registers. The 'real' registers are located at 54284 (\$D40C) and 54285 (\$D40D). Both sets of addresses contain the same values. However, I recommend using the lower RAM based values in your programs; no telling when Atari may change the others. These locations are updated 60 times per second. So they are pretty accurate.

Next we use good 'ole Joystick Port One to tell the computer to do something when we press our 'key'. We're going to use the 'forward' line to signal the computer and STICKO location 632 (\$278). You, of course, can use what you please in your own applications.

These light pen position memory locations do not hold actual screen positions. The values have to be interpreted to get the correct screen coordinates. For Horizontal, the left edge is 67. This value increases in increments of one, (one per color clock), until it reaches 227, then resets to zero, and again increments by one until you reach the right edge; which should be 7. For the Vertical, the upper edge is 16, it increments by one, (one per two scan lines), for a maximum of 111 at the bottom.

Well that covers the software part and a little theory. Now to build one of these jewels.

CONSTRUCTION

First look over the parts list. Most everything is available at Radio Shack, or really most any hobby electronics shop, except the large marker pen body. That you'll have to scrounge up somewhere or destroy a good marker to get one.

Next is the cable for the light pen. I used a very flexible intercom cable that had 4 wires in it, and a 'D' type female 9 pin connector. I bent the side tabs back to make it fit into my 1200XL joystick port (Ed., This shouldn't be necessary on other computer models). Then I just soldered the four wires in place as shown in the schematic.

I placed my 'key' switch (S1) about a foot from the joystick port, you can put yours where you want it. You could even put it inside the marker body if you can find one small enough and that you can press 'on' comfortably.

I cut the cable at the 12 inch mark and found the Ground and Forward line wires (#8 and #1 respectively). I soldered in switch S1, and reconnected all wires except the one for the Forward (it's done it's job).

Now we're up at the end of our rope, oops, I meant wire. Cut the following leads on the I.C. (just where the 'fat' part of the lead starts): 4, 5, 6, 8, 9, 10, 11, 12, and 13.

Cut a hole in the end cap of the marker tube, just big enough to fit through the cable you are using. Put the cable through the end cap.

Next we start soldering to the I.C.. Solder the +5vdc wire to pin 14. Solder the Trigger wire to pin 3. Solder a small jumper, (the 1 inch piece of wire), to pins 1 and 2.

Solder one end of the 2000 (2K) ohm resistor to pin 7 along with the Ground wire. Now connect the other end of the resistor to pin 1 or 2.

Here is where those two 6 inch pieces of #30 wire come in (i.e., 30 gauge, wirewrap wire). Connect a wire from pin 1 or 2 of I.C. to the photo transistor, lead 1. Connect a wire from pin 14 of the I.C. to pin 3 of photo transistor. (I would put shrink tubing over these connections to prevent them from shorting). Cut lead 2 off of the photo transistor, if it has one (they vary from company to company).

Well that's all the tough stuff. Now you put the photo transistor into the marker tube, use a dull pencil and push it all the way down the tube until it comes up flush on the narrow end of the tube.

Next insert the I.C. into the tube. Tie a knot in the cable or a plastic 'tie-tie' on the 'inside' end of the cap - this is to relieve cable stress.

Go ahead and put the cover on and you're done!

TESTING and FINIS

The BASIC program listing, below, just checks to see if everything works okay. It is well commented. There are at least a few hundred applications you could write yourself. I may write one in the future myself and send it in to PSAN. Well, that's it for me, enjoy yourselves!!!

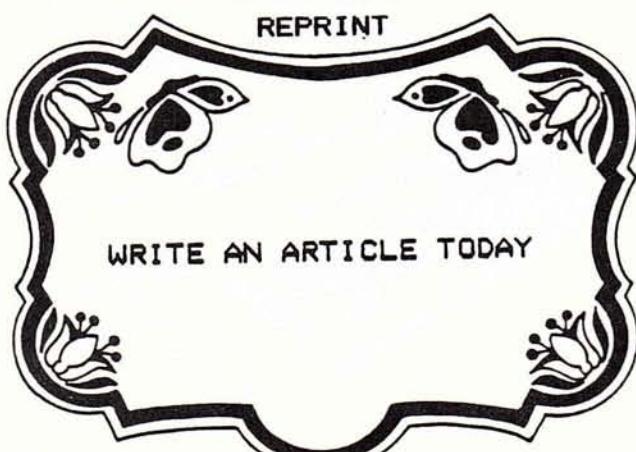
PARTS LIST

1 ea.) Photo transistor FPT100A
 (1 ea.) 2K ohm, 1/8 or 1/4 watt resistor *
 (1 ea.) 74LS132 integrated circuit
 (1 ea.) Single Pole, Single Throw, (SPST), pushbutton switch
 (1 ea.) 9 pin 'D' type, female connector
 (4 ft. or more) of 4 conductor wire flexible cable.
 (13 inches) of #30 wire. (30 gauge, wirewrap wire). Cut into
 3 pieces: two of 6 inches and one of 1 inch lengths.
 (1 ea.) Large Marker Body. Approximate dimensions (length X
 diameter): 6 X 1/2 inch. *** Make sure it has a removable end
 cap! ***
 (4 inches) of 'Shrink' tubing (optional).

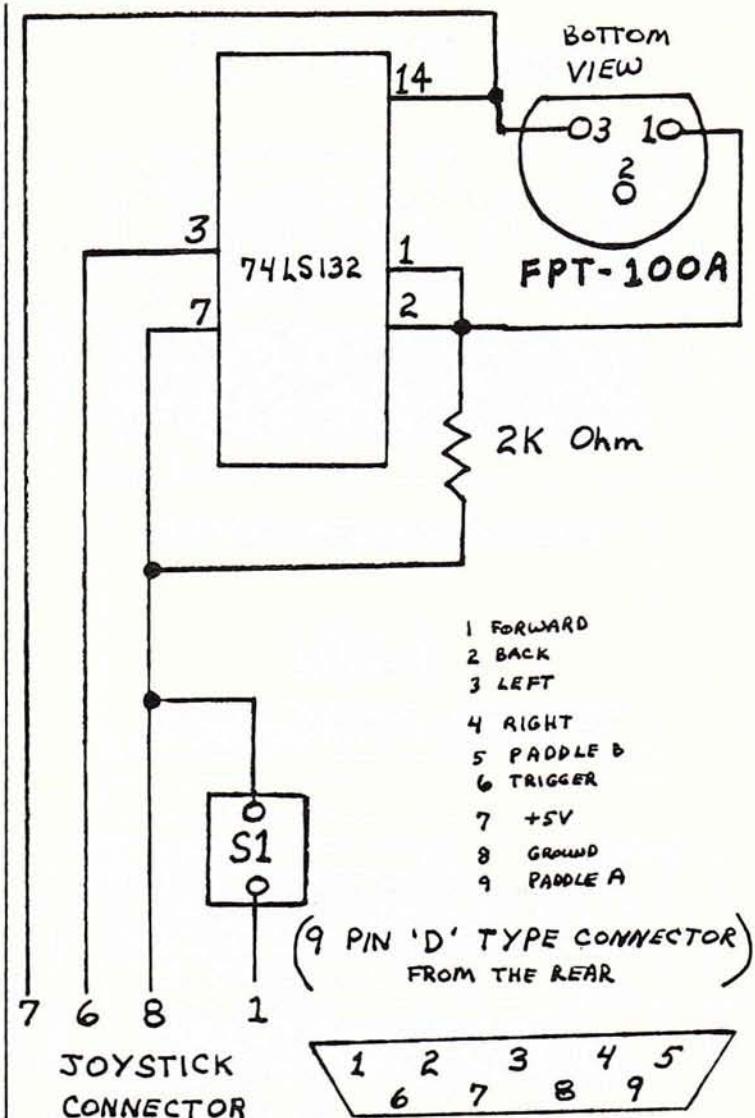
* NOTE you might have to change the value of the 2K ohm to
 suit your monitor; it should however, never be less than 1K
 ohm.

```
0 REM LIGHT PEN TEST PROGRAM
5 REM By Thom Lawless, 'R' Atari Club
10 REM 100; GRAPHICS WITH A TEXT WINDOW
20 REM 110 LPEN VERTICAL POSITION
30 REM 120 LPEN HORIZONTAL
40 REM 130 ADJUSTED VERTICAL POS.
50 REM 140 - 160 ADJUST HORIZONTAL
60 REM 170 CHECK FOR 'KEY' ON
70 REM IF 'KEY ON THEN PRINT SCREEN
80 REM AND PEEK VALUES TO SCREEN
90 REM 180 START IT OVER AGAIN
100 GRAPHICS 7:SETCOLOR 4,8,8
110 Y=PEEK(565)
120 X=PEEK(564)
130 Y1=Y:Y1=Y1-16:IF Y1<0 THEN Y1=0
140 X1=X:IF X1<33 THEN X1=X1+227
150 X1=X1-67:IF X1<0 THEN X1=0
160 IF X1>159 THEN X1=159
170 IF PEEK(632)=14 THEN ? X,X1,Y,Y1
180 GOTO 110
```

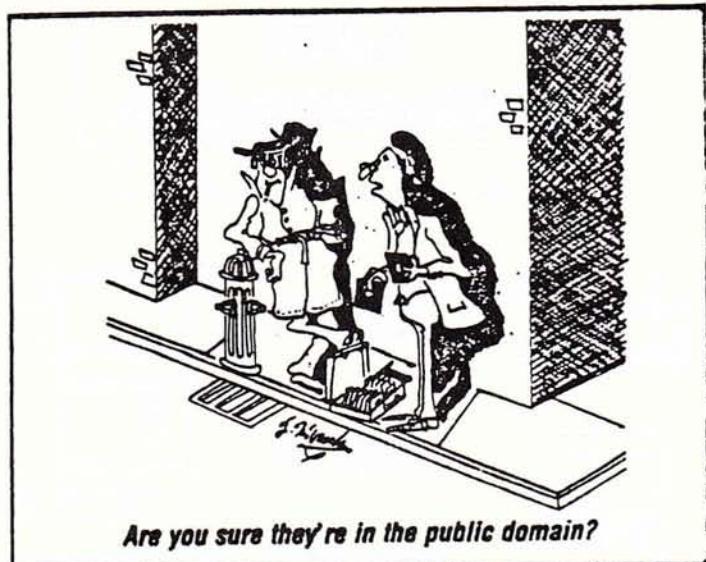
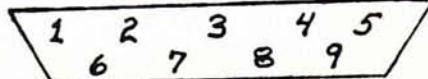
REPRINT



"Friendly no, but it is user tolerant."

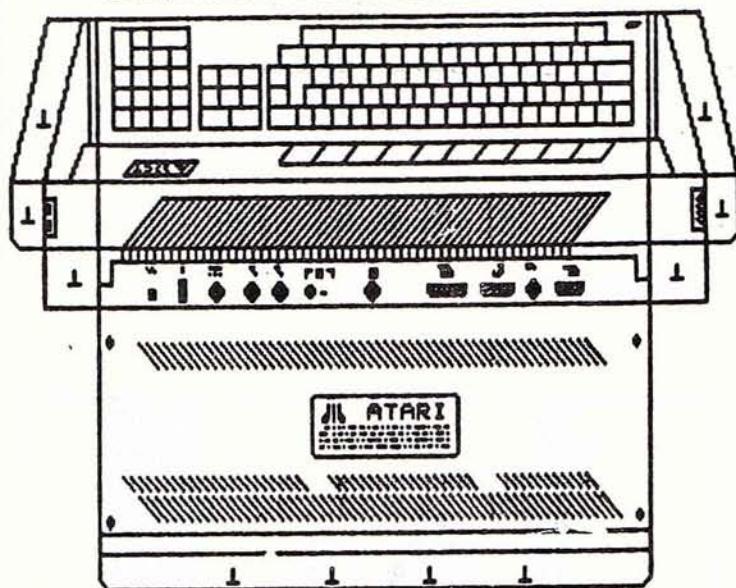
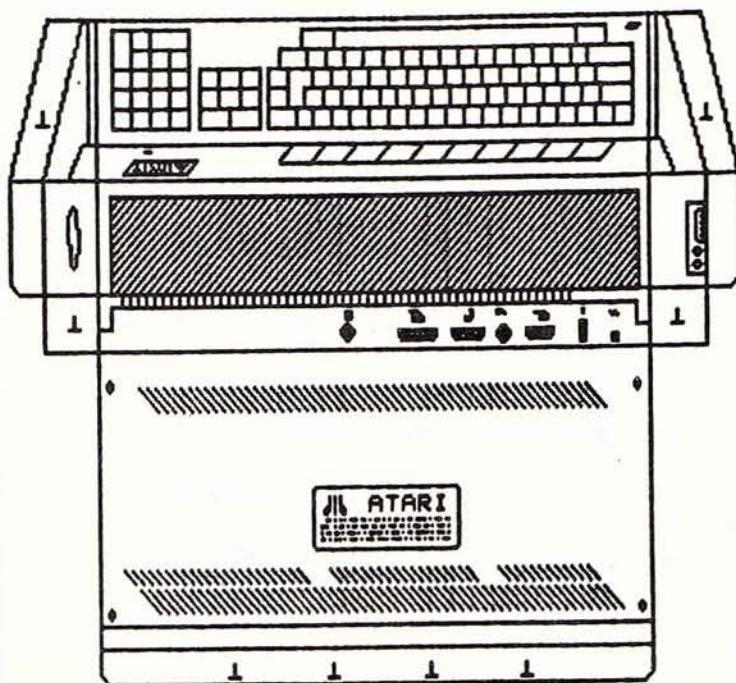


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CONNECTOR

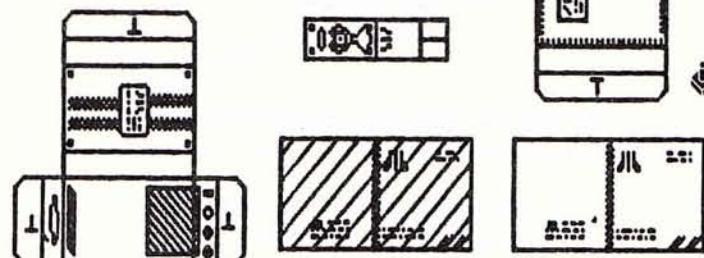


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Memory:

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MEGA ST2™

MEGA ST4™

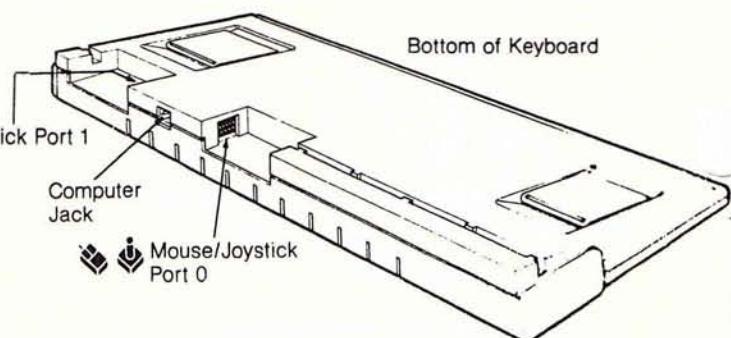
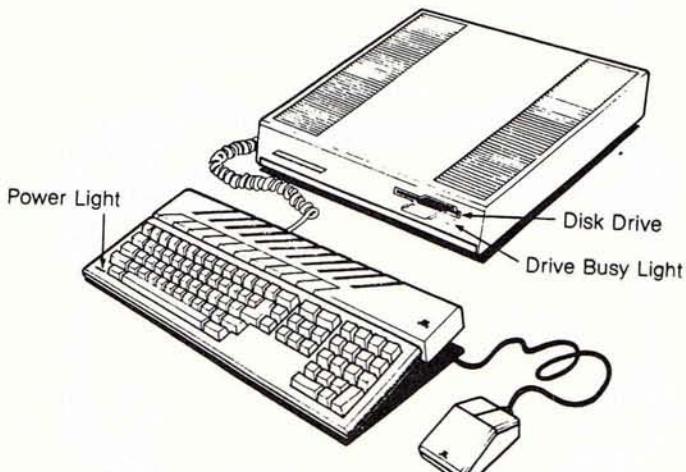
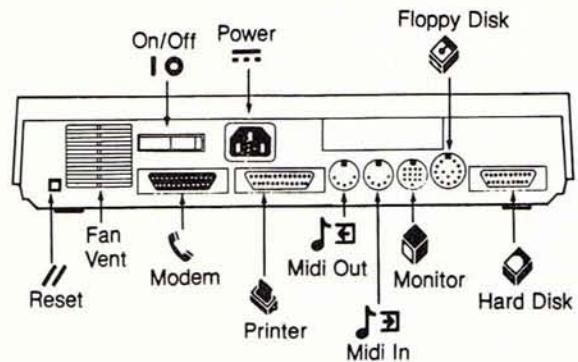
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2 megabytes (2,097,152 bytes) of RAM; 192 kilobytes (196,608 bytes) of ROM

4 megabytes (4,194,304 bytes) of RAM; 192 kilobytes (196,608 bytes) of ROM

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Many types of external devices, called peripherals, can be attached to the back panel of your MEGA ST Computer.



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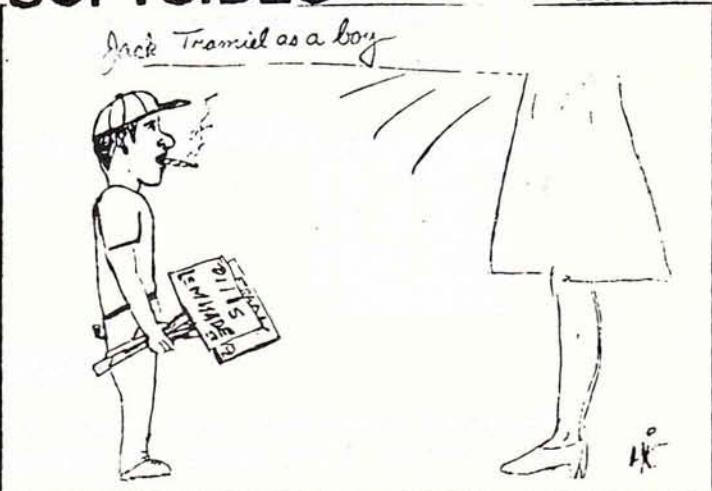
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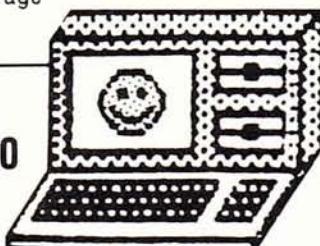
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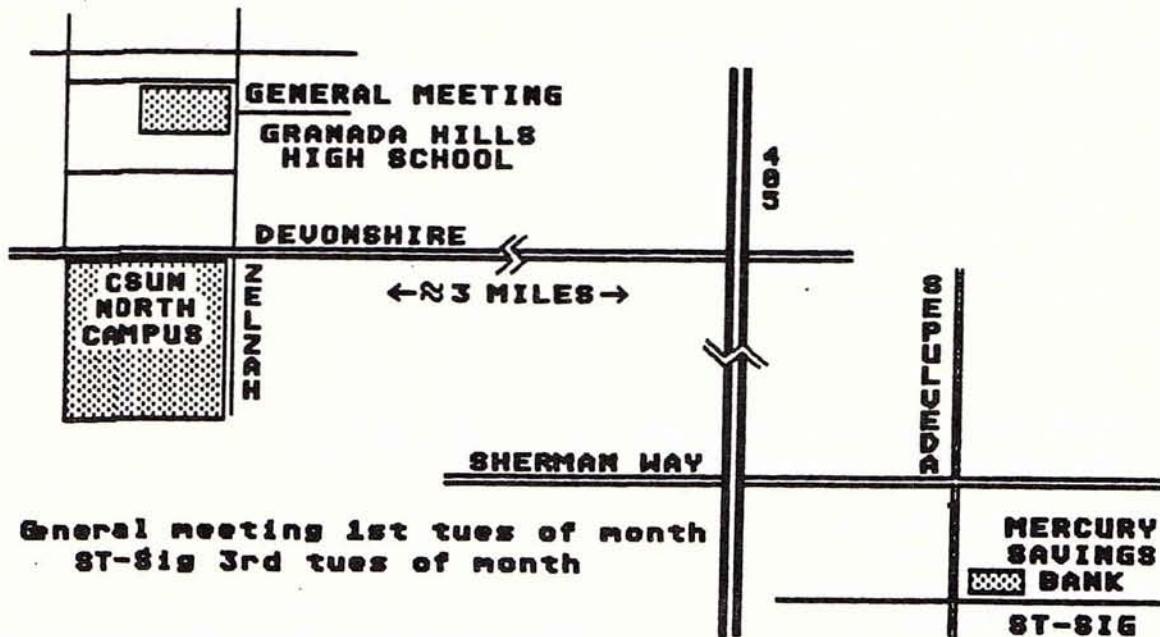
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